

集中講義

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日程 1月26日(木) 4限~5限(14:55~18:35)
1月27日(金) 2限~3限(10:25~14:45)
2月 1日(水) 2限~3限(10:25~14:45)
2月 2日(木) 2限~3限(10:25~14:45)

場所 【1~3日目】16-827 【4日目】16-109
※4日目の講義室が異なるので留意すること

講義題目 Introduction to physics of chiral magnets

講義概要

Two dimensional chiral magnetic vortices or skyrmions represent areas of reverse magnetization localized into tubes with the diameters of nanoscale sizes. In most of nonlinear physical systems such multidimensional static solitonic states are unstable and collapse spontaneously under the influence of external or internal perturbations. In condensed matter systems lacking inversion symmetry two- and three-dimensional localized states (chiral skyrmions) are stabilized by a specific mechanism imposed by handedness of the underlying structure. This singles out condensed matter systems with intrinsic and induced chirality (noncentrosymmetric magnetic crystals, multiferroics, ferroelectrics, and liquid crystals) into a particular class of materials where skyrmions can be induced and manipulated.

Theoretically magnetic chiral skyrmions have been predicted in 1989. The first direct observations of chiral skyrmions have been carried out by Y. Tokura group (RIKEN, Tokyo University) in 2010. During next years chiral skyrmions have been discovered in several groups of noncentrosymmetric magnetic compounds and nanolayers. These solitonic states are considered as very promising objects for new generations of magnetic storage technologies and for other spintronic applications. Magnetic chiral skyrmions belong to a large family of solitons and are described by nonlinear differential equations.

The lectures start from several representative examples of solitons and introduce basic mathematical methods for their description. The second part of the lectures overviews physical properties of magnetic skyrmions and discusses possible ways of their applications in spintronics.

授業使用言語 英語
(授業科目名)

相関基礎科学特殊講義HI

31M283-1403A/31D283-1403A

※最終学年の履修者は、本科目の単位が修了判定の単位としては含まれない可能性がありますのでその点を留意してください。

なお、3月公開の成績には単位として認定されます。

(※日程・場所等について変更がある場合は、掲示を更新するので注意すること)

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